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Dated 6 April 2005

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# Request for grant of a patent

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|---|---|---|
| 1. | Your reference | RRH/JJ/PJ.28 |
| 2. | Patent application number *(The Patent Office will fill this part in)* | 0405860.8 — 16 MAR 2004 |
| 3. | Full name, address and postcode of the or of each applicant *(underline all surnames)* | Cintec International Ltd<br>Cintec House<br>11 Goldtops<br>Newport<br>Gwent<br>NP20 4PH<br>United Kingdom |
| | Patents ADP number *(if you know it)* | 7929987002 |
| | If the applicant is a corporate body, give the country/state of its incorporation | |
| 4. | Title of the invention | Bomb Bin |
| 5. | Name of your agent *(if you have one)* | Wynne-Jones, Lainé & James, |
| | "Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)* | 33 St Mary Street<br>CARDIFF<br>CF10 1AF |
| | Patents ADP number *(if you know it)* | 1792002 |

| | | Country | Priority application number *(if you know it)* | Date of filing *(day / month / year)* |
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| 6. | Priority: Complete this section if you are declaring priority from one or more earlier patent applications, filed in the last 12 months. | - | - | |

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| | | |
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| 8. | Is a Patents Form 7/77 (Statement of inventorship and of right to grant of a patent) required in support of this request? | Yes |

Answer YES if:

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.

Otherwise answer NO (See note d)



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9. Accompanying documents: A patent application must include a description of the invention. Not counting duplicates, please enter the number of pages of each item accompanying this form:

| | |
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| Continuation sheets of this form | 0 |
| Description | 7 |
| Claim(s) | 0 |
| Abstract | 0 |
| Drawing(s) | 2 only |

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10. If you are also filing any of the following, state how many against each item.

| | |
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| Priority documents | |
| Translations of priority documents | |
| Statement of inventorship and right to grant of a patent (Patents Form 7/77) | |
| Request for a preliminary examination and search (Patents Form 9/77) | |
| Request for a substantive examination (Patents Form 10/77) | |
| Any other documents (please specify) | |

11. I/We request the grant of a patent on the basis of this application.

Signature(s) Wynne-Jones, Lainé & James (Wynne-Jones,Lainé & James) Date 16.03.04

12. Name, daytime telephone number and e-mail address, if any, of person to contact in the United Kingdom

R R Halstead
(029) 2022 9526

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## Bomb Bin

This invention relates to bomb bins for protecting nearby structures against the effects of an explosion.

It is well known to use water to mitigate against the effects of an explosion and, for example, EP 0276918 described various forms of inflatable structures which may be placed over and around a bomb in order to mitigate against the effects of any subsequent explosion. This concept is taken a further step by the use of drop stitch material as taught in GB 2374625, the disclosure of which is incorporated herein by reference, the drop stitch material allowing protective walls to be erected quickly which are taller than the width of the base and which may initially be filled with air to attain their desired shape followed by water to mitigate against any subsequent blast.

It is further known from a paper by Messrs Keenan and Wager dating from 1992 at the 25th DoD Explosives Safety Seminar at Anaheim, California, that where water is allowed to aerosolise by being located at or near the proximity of a subsequent explosion the aerosolised water prevents combustion of detonation products by preventing access to oxygen and by cooling gases below the temperature required to sustain combustion. They also found that vaporisation of water absorbs 539 calories/gram plus 1 calorie/gram/degree to heat the water to 100°C, thereby concluding that aerosolised water can absorb all of the detonation energy of explosive if the weight ratio of water to explosive is 930/539 i.e. 1.8 for TNT explosive and 3.8 for H-6 explosive. Tests they conducted concluded that the peak gas pressure and total gas impulse present can be lowered by as much as 90% than in the case of the corresponding peak

gas pressure and total gas impulse in the absence of water. They also found that providing 2.89lbs of water for each pound of TNT explosive reduced the peak gas pressure from 51.1lbs per sq inch to just 5.85 lbs per sq inch for a total reduction therefor of nearly 90%. They therefore proposed various configurations for use in and around military installations including a transportable bomb cart, being a reinforced container and associated lid into which may be placed e.g. an explosive device and around which may be suspended water filled rupturable containers which permitted the water to be aerosolised in the event of an explosion, thereby reducing the effects of the explosion accordingly.

This concept is refined further in the teaching of GB 2 289 750 issued to Parkes in which unwanted munitions can be effectively disposed of by arranging for lay flat plastic tubing filled with water to be draped over rigid supports such that separated volumes of water and air are present in a line away from the intended source of a blast when the munitions are detonated through the use of a control charge.

A problem with the foregoing prior art apparatus and methods is that the weight of water constitutes a significant disadvantage where e.g. a terrorist device has to be dealt with, especially on airborne vehicles such as passenger planes. A "worst case" scenario is that a bomb is discovered in e.g. the heel of the shoe of a suicide bomber which may or may not detonate prior to the plane landing or descending to a height at which the device may be safely jettisoned.

The present invention is derived from the surprising realisation that many aircraft, including passenger aircraft, have reasonably substantial quantities of

water or other liquids on board for use in galleys and on board toilets which could be diverted to a stowed blast mitigation bin into which the device may be put to thereafter mitigate against the effects of any subsequent explosion before the plane has landed.

According to the invention there is provided a water fillable blast suppression bin comprising an inflatable container for holding e.g. a bomb, the container comprising an outer layer of ballistic-grade material acting as a last line of containment for a subsequent blast, one or more internal layers for forming containers for holding water and/or gas and/or material layers to provide separated volumes of water and/or gas, such as nitrogen, in use, and/or material, such as mineral wool, and a closure lid also having an outer layer of ballistic-grade material and one or more layers of water and/or gas fillable containers and/or material.

Conveniently, the gas may be nitrogen and may be contained in individual fillable polythene bags from e.g. a nitrogen containing cylinder under pressure.

Preferably, the blast suppression bin has, when filled, volumes of gas such as nitrogen contained in e.g. individual polythene bags placed around a suspect device, followed by a layer of water in a fillable container, such as made of dropstitch material, followed by a layer of gas, such as nitrogen, followed by a final layer of water adjacent the ballistics grade outer layer. Alternatively, in place of one or more layers of gas or water one or more layers of material, such as mineral wool, could be used to progressively dampen the effects of an explosion to hopefully contain it wholly or substantially wholly within the blast suppression bin, at least to the extent that the detonation does not cause

structural damage to a vehicle in which it is used, such as an aeroplane.

The invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a part perspective view of a first embodiment of blast suppression bin according to the invention, and

Figure 2 is a part perspective view of a preferred embodiment of blast suppression bin according to the invention.

Referring firstly to Figure 1 there is shown a part cutaway view of a first embodiment of blast suppression bin shown generally at 1 with the front wall removed for clarity, the suppression bin comprising a container portion 2 and a lid portion 3 (shown raised for clarity) which may be strapped to the container portion 2 by straps (not shown) of e.g. reinforced ballistics-grade webbing material such that in the event of detonation of e.g. a TNT bomb, as shown, the lid 3 tends to remain in position attached to the container portion 2 in use.

When assembled together the blast suppression bin 1 has outer walls 4 comprising or including ballistics grade material, such as Kevlar, to act as a last line of containment for a blast. In order to inhibit the effects of an explosion from e.g. a TNT bomb internal walls of the container 2 are made of drop stitch or similar material by which separated volumes of water/gas or material, such as mineral wool, may be constructed. In the subject example the outer container 6 may initially be inflated with air to assume its generally cuboid shape and then the air replaced with water piped in from elsewhere, such as a suitable water pipe from within the body of an aircraft. The inner container 7 may be simply filled with e.g. mineral wool which is known to suppress the effects of e.g. a blast

from an explosive device, including shrapnel or "fly" and, similarly, the device itself may be surrounded by gas filled polythene bags 8, preferably nitrogen filled, placed around the TNT charge so that it is held in the middle of the blast suppression bin 1.

In the event of the TNT exploding it will be appreciated that the presence of e.g. nitrogen in its immediate surroundings helps to prevent or inhibit ignition in the immediate surroundings, and the presence of the mineral wool 7 can help to soften the impact of and catch any flying debris, whereafter the presence of the water filled container 6 allows the water to absorb some of the shock of the explosion, and finally the ballistic grade outer covering 4 may completely, or at least sufficiently, mitigate against the effect of the explosion such that it is insufficient to cause catastrophic consequences to e.g. the structure of the vehicle in which it is carried.

Turning now to the preferred embodiment shown in Figure 2, where like parts are given like numbers, this takes advantage of the principle discussed in the Keenan and Wager prior art and later prior art in that it teaches that it is preferable to ensure that water placed next to a charge is immediately aerosolised as discussed above in the preamble hereto by providing a relatively small volume of water next to e.g. a TNT bomb so as to maximise the chances of it being completely aerosolised before the shock wave carries on through the remaining part of the structure. This can be achieved by having a relatively thin inner container 9, again made typically of drop stitch material, which can be filled with water and between which is an intermediate container 10 which may simply be filled with a gas such as nitrogen or even air such that in combination with the

outer container 6 being filled with water the shock wave, for example, first passes through a small amount of water which is aerosolised, then through the gas and then through a larger mass of water in the container 6 before the shock wave hits the outer walls 4 of ballistic-grade material.

In order to ensure that the explosive charge is placed as centrally as possible within the blast suppression bin a plinth 11 may be provided, although it will be appreciated that other forms of support may be used and in particular supports which allow the shock wave from detonation to hit the water in the first container 9 in an unimpeded manner so as to maximise the chances of complete aerosolisation of that water. The plinth may be made of e.g. a rigid plastics support frame so as to ensure as far as possible that aerosolisation is generally spherical and is not biased in any particular direction. Alternatively, filled bags of gas, such as nitrogen, may be placed around the support device in the manner as shown in Figure 1.

In a further, preferred, refinement the blast mitigation bin includes its own charge of compressed gas so that it may be immediately available for initially inflating the drop stitch containers, which is then replaced with water via the use of a pressure relief valve. The pressure relief valve may be configured to vent gas, such as nitrogen or carbon dioxide, into the interior of the bomb bin so as to mitigate against ignition of detonation products immediately after an explosion. In a still further refinement the bomb bin is storable in its deflated condition and is pre-connected to a hose for liquid, such as water from the galley of a passenger plane, so that the hose can be deployed quickly and connected to the main water system in the plane. In a still further refinement the inner water-

fillable container where fitted is adapted to be filled first so that in the event the outer water fillable container has not been fitted at the time an explosion occurs the inner layer of water is used most efficiently by being aerosolised, so as to minimise the strength of the resulting shock wave.

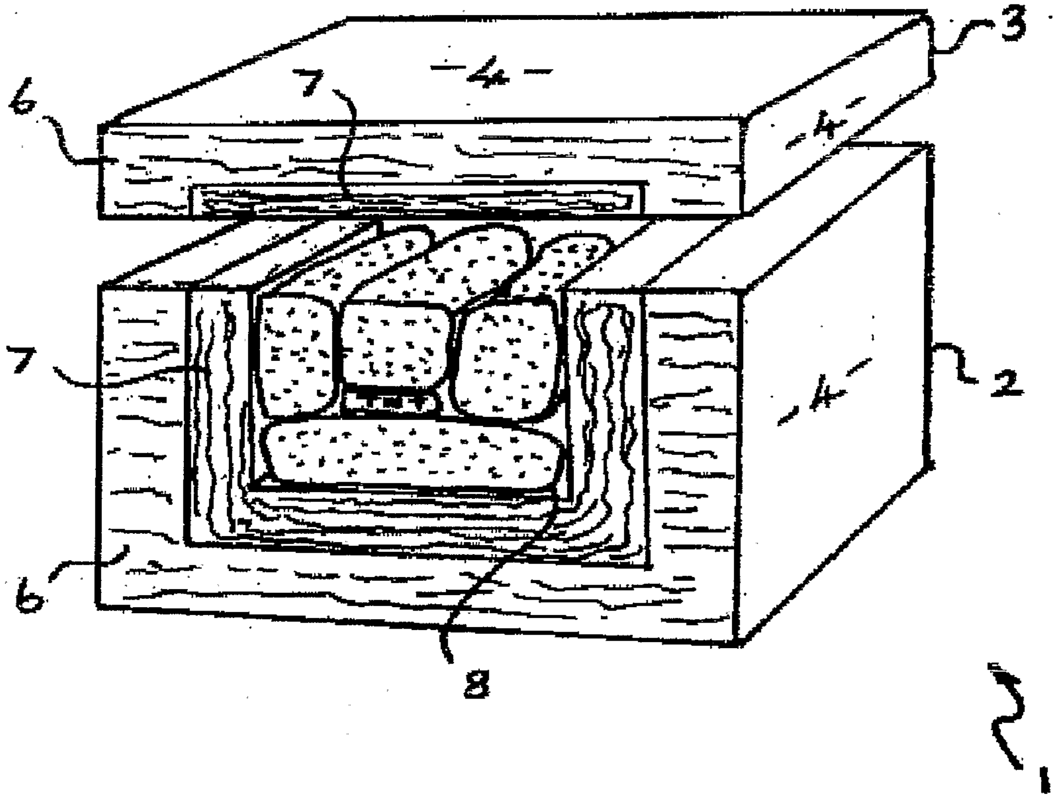


FIGURE 1

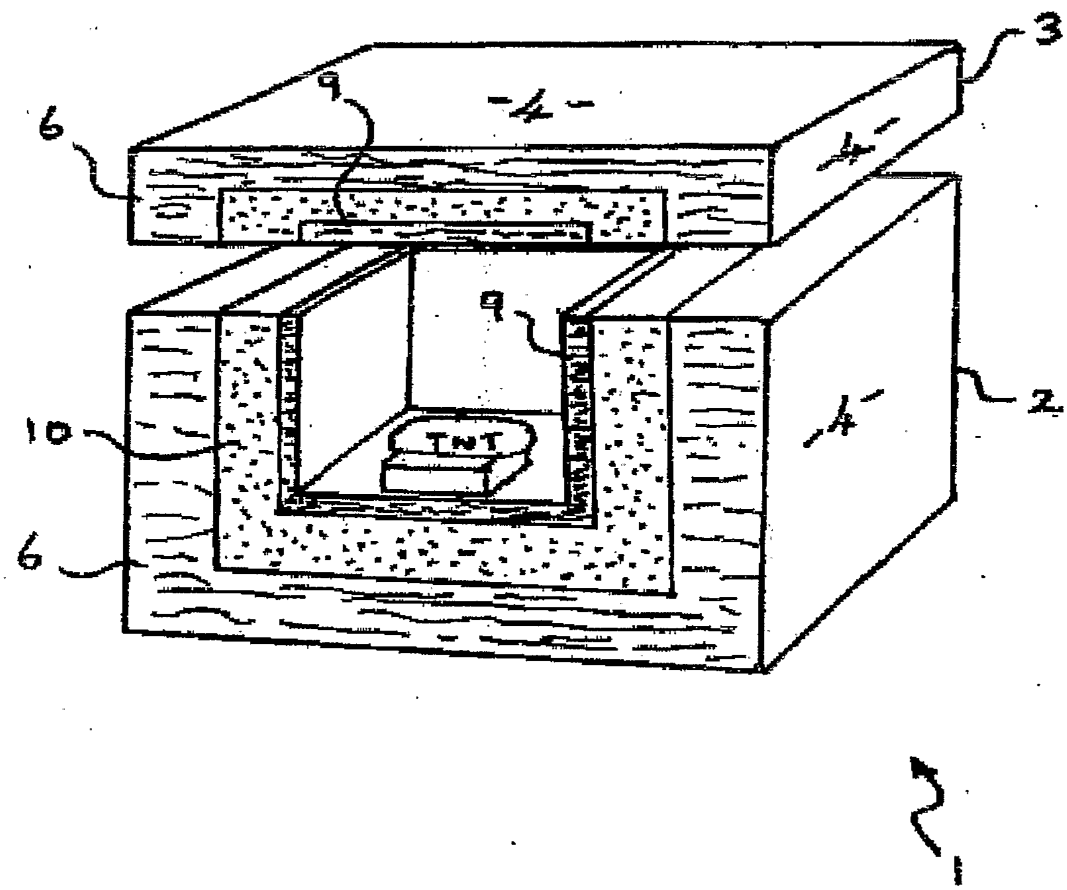


FIGURE 2